Creating a "Component Meta-Feature"

Introduction

Example and guidline of creating an OSGi *Meta-Feature* or *Feature-All* or Feature-aggregator.

The Component here is an SDN-R microservice consisting of two OSGi bundles.

More specific:

- Microservice name: northbound
- Included OSGi bundles: helloworld, goodbyworld
- Meta-Feature: sdnr-northbound-all

Content

Goodbye World

The next step after Creating an Instance of SDNR and Creating and Installing a New Feature into SDNR is to create a "component meta-feature" or "feature aggregator" that groups the SDNR northbound features together and enables them to be installed into OpenDaylight using a single reference. The first step is to create a second feature (Goodbye World) in the same repository as Hello World, shown here. Goodbye World is identical to Hello World except for name changes.

```
%: # pwd ~/git/ccsdk/features/sdnr/northbound
%: tree
.
├── goodbyeworld
│   ├── feature
│   │   └── pom.xml
│   ├── installer
│   │   ├── pom.xml
│   │   └── src
│   │       ├── assembly
│   │       │   └── assemble_mvnrepo_zip.xml
│   │       └── main
│   │           └── resources
│   ├── model
│   │   ├── pom.xml
│   │   └── src
│   │       └── main
│   │           └── yang
│   │               └── Goodbyeworld.yang
│   ├── pom.xml
│   └── provider
│       ├── pom.xml
│       └── src
│           └── main
│               ├── java
│               │   └── org
│               │       └── onap
│               │           └── ccsdk
│               │               └── features
│               │                   └── sdnr
│               │                       └── northbound
│               │                           └── goodbyeworld
│               │                               └── GoodbyeworldProvider.java
│               └── resources
│                   └── org
│                       └── opendaylight
│                           └── blueprint
│                               └── impl-blueprint.xml
└── helloworld
    ├── feature
    │   └── pom.xml
    ├── installer
    │   ├── pom.xml
    │   └── src
    │       ├── assembly
    │       │   └── assemble_mvnrepo_zip.xml
    │       └── main
    │           └── resources
    ├── model
    │   ├── pom.xml
    │   └── src
    │       └── main
    │           └── yang
    │               └── Helloworld.yang
    ├── pom.xml
    └── provider
        ├── pom.xml
        └── src
            └── main
                ├── java
                │   └── org
                │       └── onap
                │           └── ccsdk
                │               └── features
                │                   └── sdnr
                │                       └── northbound
                │                           └── helloworld
                │                               └── HelloworldProvider.java
```

```
└── resources
    └── org
        └── opendaylight
            └── blueprint
                └── impl-blueprint.xml
```

The **feature pom.xml** file for **goodbyeworld** - shown below - is simpler than the file we discussed earlier because there is no longer any residual code from the "pre-Casablanca" method for installing features into karaf. It is straightforward and simply generates the features.xml file in the local maven repository.

```
<?xml version="1.0" encoding="UTF-8"?>
<project xmlns="http://maven.apache.org/POM/4.0.0" xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
  xsi:schemaLocation="http://maven.apache.org/POM/4.0.0 http://maven.apache.org/xsd/maven-4.0.0.xsd">
  <modelVersion>4.0.0</modelVersion>

  <parent>
    <groupId>org.onap.ccsdk.parent</groupId>
    <artifactId>single-feature-parent</artifactId>
    <version>1.1.0-SNAPSHOT</version>
    <relativePath />
  </parent>

  <groupId>org.onap.ccsdk.features.sdnr.northbound</groupId>
  <artifactId>sdnr-goodbyeworld</artifactId>
  <version>0.3.0-SNAPSHOT</version>
  <packaging>feature</packaging>

  <name>ccsdk-features-sdnr-northbound :: goodbyeworld :: ${project.artifactId}</name>

  <dependencyManagement>
    <dependencies>
      <dependency>
        <groupId>org.opendaylight.mdsal.model</groupId>
        <artifactId>mdsal-model-artifacts</artifactId>
        <version>${odl.mdsal.model.version}</version>
        <type>pom</type>
        <scope>import</scope>
      </dependency>
      <dependency>
        <groupId>org.opendaylight.controller</groupId>
        <artifactId>mdsal-artifacts</artifactId>
        <version>${odl.mdsal.version}</version>
        <type>pom</type>
        <scope>import</scope>
      </dependency>
    </dependencies>
  </dependencyManagement>

  <dependencies>

    <dependency>
      <groupId>${project.groupId}</groupId>
      <artifactId>goodbyeworld-provider</artifactId>
      <version>${project.version}</version>
    </dependency>

  </dependencies>
</project>
```

Note the artifactId

...and the packaging as a feature

State the dependency on the provider module, which has a transitive dependency on the model module

Executing 'mvn clean install' in **helloworld** and **goodbyeworld** generates the corresponding features and zip files in the local maven repository.

```
%: # pwd ~/.m2/repository/org/onap/ccsdk/features/sdnr/northbound
%: tree -P '*-repo.zip|*-features.xml'
.
├── goodbyeworld
│   └── 0.3.0-SNAPSHOT
├── goodbyeworld-installer
│   └── 0.3.0-SNAPSHOT
│       └── goodbyeworld-installer-0.3.0-SNAPSHOT-repo.zip
├── goodbyeworld-model
│   └── 0.3.0-SNAPSHOT
├── goodbyeworld-provider
│   └── 0.3.0-SNAPSHOT
├── helloworld
│   └── 0.3.0-SNAPSHOT
├── helloworld-installer
│   └── 0.3.0-SNAPSHOT
│       └── helloworld-installer-0.3.0-SNAPSHOT-repo.zip
├── helloworld-model
│   └── 0.3.0-SNAPSHOT
├── helloworld-provider
│   └── 0.3.0-SNAPSHOT
├── sdnr-goodbyeworld
│   └── 0.3.0-SNAPSHOT
│       └── sdnr-goodbyeworld-0.3.0-SNAPSHOT-features.xml
└── sdnr-helloworld
    └── 0.3.0-SNAPSHOT
        └── sdnr-helloworld-0.3.0-SNAPSHOT-features.xml
```

These are the key files used by **ccsdk/distribution/odlsli/pom.xml** when constructing the docker container.

The component meta-feature "features" directory

The next step is to create a features directory in **ccsdk/features/sdnr/northbound** with this structure and content.

```
%: # pwd ~/ccsdk/features/sdnr/northbound
%: ls
features  goodbyeworld  helloworld
%: tree features
features
├── ccsdk-features-sdnr-northbound-all
│   └── pom.xml
├── installer
│   ├── pom.xml
│   └── src
│       └── assembly
│           └── assemble_mvnrepo_zip.xml
└── pom.xml
```

We discuss each file and folder in turn, beginning with **features/pom.xml**.

```
<?xml version="1.0" encoding="UTF-8"?>
<project xmlns="http://maven.apache.org/POM/4.0.0" xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
  xsi:schemaLocation="http://maven.apache.org/POM/4.0.0 http://maven.apache.org/xsd/maven-4.0.0.xsd">
  <modelVersion>4.0.0</modelVersion>

  <parent>
    <groupId>org.onap.ccsdk.parent</groupId>
    <artifactId>odlparent-lite</artifactId>
    <version>1.1.0-SNAPSHOT</version>
    <relativePath />
  </parent>

  <groupId>org.onap.ccsdk.features.sdnr.northbound</groupId>
  <artifactId>sdnr-northbound-feature-aggregator</artifactId>
  <version>0.3.0-SNAPSHOT</version>
  <packaging>pom</packaging>

  <name>ccsdk-features-sdnr-northbound :: features</name>

  <modules>
    <module>ccsdk-features-sdnr-northbound-all</module>
    <module>installer</module>
  </modules>
</project>
```

Note the artifactId

Two modules are used

ccsdk-features-sdnr-northbound-all

Most of the work in done in the **ccsdk-features-sdnr-northbound-all** module. Its pom file is shown here.

```
<?xml version="1.0" encoding="UTF-8"?>
<project xmlns="http://maven.apache.org/POM/4.0.0" xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
  xsi:schemaLocation="http://maven.apache.org/POM/4.0.0 http://maven.apache.org/xsd/maven-4.0.0.xsd">
  <modelVersion>4.0.0</modelVersion>

  <parent>
    <groupId>org.onap.ccsdk.parent</groupId>
    <artifactId>single-feature-parent</artifactId>
    <version>1.1.0-SNAPSHOT</version>
    <relativePath />
  </parent>

  <groupId>org.onap.ccsdk.features.sdnr.northbound</groupId>
  <artifactId>sdnr-northbound-all</artifactId>
  <version>0.3.0-SNAPSHOT</version>
  <packaging>feature</packaging>

  <name>ccsdk-features-sdnr-northbound :: features :: ${project.artifactId}</name>
  <dependencyManagement>
    <dependencies>
      <dependency>
        <groupId>org.opendaylight.mdsal.model</groupId>
        <artifactId>mdsal-model-artifacts</artifactId>
        <version>${odl.mdsal.model.version}</version>
        <type>pom</type>
        <scope>import</scope>
      </dependency>
      <dependency>
        <groupId>org.opendaylight.controller</groupId>
        <artifactId>mdsal-artifacts</artifactId>
        <version>${odl.mdsal.version}</version>
        <type>pom</type>
        <scope>import</scope>
      </dependency>
    </dependencies>
  </dependencyManagement>

  <dependencies>
    <dependency>
      <groupId>${project.groupId}</groupId>
      <artifactId>sdnr-helloworld</artifactId>
      <version>${project.version}</version>
      <type>xml</type>
      <classifier>features</classifier>
    </dependency>
    <dependency>
      <groupId>${project.groupId}</groupId>
      <artifactId>sdnr-goodbyeworld</artifactId>
      <version>${project.version}</version>
      <type>xml</type>
      <classifier>features</classifier>
    </dependency>
  </dependencies>
</project>
```

This artifactId value is used as the feature name in the “featuresBoot” parameter in $ODL_HOME/etc/org.apache.karaf.features.cfg

The output of this pom is a features file

The dependencies are the features files of helloworld and goodbyeworld

Installer pom.xml file

Now we look at **features/installer/pom.xml**. The file is very similar to the pom.xml file for the sliapi installer, although it is simpler because it does not include the "pre-Casablanca" code. Its dependency is the **sdnr-northbound-all** artifact created immediately above, and it copies the maven repositories of all the features.xml files with the groupId **org.onap.ccsdk.features.sdnr.northbound**.

```xml
<?xml version="1.0" encoding="UTF-8"?>
<project xmlns="http://maven.apache.org/POM/4.0.0" xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
  xsi:schemaLocation="http://maven.apache.org/POM/4.0.0 http://maven.apache.org/xsd/maven-4.0.0.xsd">
  <modelVersion>4.0.0</modelVersion>

  <parent>
    <groupId>org.onap.ccsdk.parent</groupId>
    <artifactId>odlparent-lite</artifactId>
    <version>1.1.0-SNAPSHOT</version>
    <relativePath />
  </parent>

  <groupId>org.onap.ccsdk.features.sdnr.northbound</groupId>
  <artifactId>sdnr-northbound-features-installer</artifactId>
  <version>0.3.0-SNAPSHOT</version>
  <packaging>pom</packaging>

  <name>ccsdk-features-sdnr-northbound :: features :: ${project.artifactId}</name>

  <properties>
    <application.name>sdnr-northbound-all</application.name>
    <include.transitive.dependencies>false</include.transitive.dependencies>
  </properties>

  <dependencies>
    <dependency>
      <groupId>org.onap.ccsdk.features.sdnr.northbound</groupId>
      <artifactId>${application.name}</artifactId>
      <version>${project.version}</version>
      <type>xml</type>
      <classifier>features</classifier>
      <exclusions>
        <exclusion>
          <groupId>*</groupId>
          <artifactId>*</artifactId>
        </exclusion>
      </exclusions>
    </dependency>
  </dependencies>

  <build>
    <plugins>
      <plugin>
        <groupId>org.apache.maven.plugins</groupId>
        <artifactId>maven-dependency-plugin</artifactId>
        <executions>
          <execution>
            <id>copy-dependencies</id>
            <goals>
              <goal>copy-dependencies</goal>
            </goals>
            <phase>prepare-package</phase>
            <configuration>
              <transitive>false</transitive>
              <outputDirectory>${project.build.directory}/assembly/system</outputDirectory>
              <overWriteReleases>false</overWriteReleases>
              <overWriteSnapshots>true</overWriteSnapshots>
              <overWriteIfNewer>true</overWriteIfNewer>
              <useRepositoryLayout>true</useRepositoryLayout>
              <addParentPoms>false</addParentPoms>
              <copyPom>false</copyPom>
              <includeGroupIds>org.onap.ccsdk.features.sdnr.northbound</includeGroupIds>
              <scope>provided</scope>
            </configuration>
          </execution>
        </executions>
      </plugin>
      <plugin>
        <artifactId>maven-assembly-plugin</artifactId>
        <executions>
          <execution>
            <id>maven-repo-zip</id>
            <goals>
              <goal>single</goal>
            </goals>
            <phase>package</phase>
            <configuration>
              <attach>true</attach>
              <finalName>stage/${application.name}-${project.version}</finalName>
              <descriptors>
                <descriptor>src/assembly/assemble_mvnrepo_zip.xml</descriptor>
```

The artifactId follows the convention of <feature-name>-installer for the directories that hold an <artifactId>-<version>-repo.zip file

This is the artifactId created by the ccsdk-features-sdnr-northbound-all module

The dependency is on that same artifactId

Copy the maven repositories of the listed groupIds into the assembly area

GroupIds are included rather than artifactIds

Zip up the maven repository of the artifact

```
            </descriptors>
            <appendAssemblyId>true</appendAssemblyId>
          </configuration>
        </execution>
      </executions>
    </plugin>
  </plugins>
 </build>
</project>
```

mvn clean install

We now execute 'mvn clean install' and see the output. As a reminder, this is the initial state of the **features** directory.

```
%: # pwd ~/ccsdk/features/sdnr/northbound
%: ls
features  goodbyeworld  helloworld
%: tree features
features
├── ccsdk-features-sdnr-northbound-all
│   └── pom.xml
├── installer
│   ├── pom.xml
│   └── src
│       └── assembly
│           └── assemble_mvnrepo_zip.xml
└── pom.xml
```

And this shows the critical files afterwards: **feature.xml** and **sdnr-northbound-all-0.3.0-SNAPSHOT-repo.xml**.

```
%: # pwd ~/git/ccsdk/features/sdnr/features
%: tree -P 'feature.xml|*-repo.zip'
.
├── ccsdk-features-sdnr-northbound-all
│   └── target
│       ├── antrun
│       ├── classes
│       │   └── META-INF
│       │       └── maven
│       ├── dependency-maven-plugin-markers
│       ├── failsafe-reports
│       ├── feature
│       │   └── feature.xml
│       ├── javadoc-bundle-options
│       ├── pax
│       ├── SFT
│       └── surefire-reports
├── installer
│   ├── src
│   │   └── assembly
│   └── target
│       ├── archive-tmp
│       ├── assembly
│       │   └── system
│       │       └── org
│       │           └── onap
│       │               └── ccsdk
│       │                   └── features
│       │                       └── sdnr
│       │                           └── northbound
│       │                               └── sdnr-northbound-all
│       │                                   └── 0.3.0-SNAPSHOT
│       ├── failsafe-reports
│       └── stage
│           └── sdnr-northbound-all-0.3.0-SNAPSHOT-repo.zip
└── target
    └── failsafe-reports
```

Here is the content of the zip file, which - as expected - is the maven repository for the generated **features.xml** file.

```
%: unzip -Z installer/target/stage/sdnr-northbound-all-0.3.0-SNAPSHOT-repo.zip
Archive:  installer/target/stage/sdnr-northbound-all-0.3.0-SNAPSHOT-repo.zip
Zip file size: 3497 bytes, number of entries: 13
drwxrwxr-x  2.0 unx        0 b- stor 18-Aug-31 22:15 system/
drwxrwxr-x  2.0 unx        0 b- stor 18-Aug-31 22:15 system/org/
drwxrwxr-x  2.0 unx        0 b- stor 18-Aug-31 22:15 system/org/onap/
drwxrwxr-x  2.0 unx        0 b- stor 18-Aug-31 22:15 system/org/onap/ccsdk/
drwxrwxr-x  2.0 unx        0 b- stor 18-Aug-31 22:15 system/org/onap/ccsdk/features/
drwxrwxr-x  2.0 unx        0 b- stor 18-Aug-31 22:15 system/org/onap/ccsdk/features/sdnr/
drwxrwxr-x  2.0 unx        0 b- stor 18-Aug-31 22:15 system/org/onap/ccsdk/features/sdnr/northbound/
drwxrwxr-x  2.0 unx        0 b- stor 18-Aug-31 22:15 system/org/onap/ccsdk/features/sdnr/northbound/sdnr-
northbound-all/
drwxrwxr-x  2.0 unx        0 b- stor 18-Aug-31 22:15 system/org/onap/ccsdk/features/sdnr/northbound/sdnr-
northbound-all/0.3.0-SNAPSHOT/
-rw-rw-r--  2.0 unx      318 b- defN 18-Aug-31 22:15 system/org/onap/ccsdk/features/sdnr/northbound/sdnr-
northbound-all/maven-metadata-local.xml
-rw-rw-r--  2.0 unx      869 b- defN 18-Aug-31 22:15 system/org/onap/ccsdk/features/sdnr/northbound/sdnr-
northbound-all/0.3.0-SNAPSHOT/sdnr-northbound-all-0.3.0-SNAPSHOT-features.xml
-rw-rw-r--  2.0 unx      622 b- defN 18-Aug-31 22:15 system/org/onap/ccsdk/features/sdnr/northbound/sdnr-
northbound-all/0.3.0-SNAPSHOT/maven-metadata-local.xml
-rw-rw-r--  2.0 unx      190 b- defN 18-Aug-31 22:15 system/org/onap/ccsdk/features/sdnr/northbound/sdnr-
northbound-all/0.3.0-SNAPSHOT/_remote.repositories
```

And here is the content of the features.xml file:

```
<?xml version="1.0" encoding="UTF-8" standalone="yes"?>
<features xmlns="http://karaf.apache.org/xmlns/features/v1.4.0" name="sdnr-northbound-all">
    <repository>mvn:org.onap.ccsdk.features.sdnr.northbound/sdnr-helloworld/0.3.0-SNAPSHOT/xml/features</repository>
    <repository>mvn:org.onap.ccsdk.features.sdnr.northbound/sdnr-goodbyeworld/0.3.0-SNAPSHOT/xml/features</repository>
    <feature name="sdnr-northbound-all" description="ccsdk-features-sdnr-northbound :: features :: sdnr-northbound-all" version="0.3.0.SNAPSHOT">
    <details>Root POM to be used in place of odlparent for CCSDK based projects</details>
    <feature version="0.3.0.SNAPSHOT" prerequisite="false" dependency="false">sdnr-helloworld</feature>
    <feature version="0.3.0.SNAPSHOT" prerequisite="false" dependency="false">sdnr-goodbyeworld</feature>
    </feature>
</features>
```

And the local maven repository has been updated with these files.

```
%: # pwd ~/.m2/repository/org/onap/ccsdk/features/sdnr/northbound
%: tree -L 1
.
├── goodbyeworld
├── goodbyeworld-installer
├── goodbyeworld-model
├── goodbyeworld-provider
├── helloworld
├── helloworld-installer
├── helloworld-model
├── helloworld-provider
├── sdnr-goodbyeworld
├── sdnr-helloworld
├── sdnr-northbound-all
├── sdnr-northbound-feature-aggregator
└── sdnr-northbound-features-installer

13 directories, 0 files
%: tree -P '*-features.xml|*-repo.zip' sdnr-northbound-*
sdnr-northbound-all
└── 0.3.0-SNAPSHOT
    └── sdnr-northbound-all-0.3.0-SNAPSHOT-features.xml
sdnr-northbound-feature-aggregator
└── 0.3.0-SNAPSHOT
sdnr-northbound-features-installer
└── 0.3.0-SNAPSHOT
    └── sdnr-northbound-features-installer-0.3.0-SNAPSHOT-repo.zip
```

We have all of the files that we need.

Modifying Construction of the ODLSLI Container

Two files need to be modified:

- **ccsdk/distribution/odlsli/pom.xml**
- **ccsdk/distribution/odlsli/src/main/docker/Dockerfile**

ccsdk/distribution/odlsli/pom.xml

```
<?xml version="1.0" encoding="UTF-8"?>
<project xmlns="http://maven.apache.org/POM/4.0.0" xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
  xsi:schemaLocation="http://maven.apache.org/POM/4.0.0 http://maven.apache.org/xsd/maven-4.0.0.xsd">
  <modelVersion>4.0.0</modelVersion>

  <parent>
    <groupId>org.onap.ccsdk.parent</groupId>
    <artifactId>odlparent-lite</artifactId>
    <version>1.1.0-SNAPSHOT</version>
    <relativePath />
  </parent>

  <groupId>org.onap.ccsdk.distribution</groupId>
  <artifactId>distribution-odlsli</artifactId>
  <version>0.3.0-SNAPSHOT</version>
  <packaging>pom</packaging>
. . .
  <dependencies>
    <dependency>
      <groupId>${project.groupId}</groupId>
      <artifactId>dependencies</artifactId>
      <version>${project.version}</version>
      <classifier>repo</classifier>
      <type>zip</type>
    </dependency>
. . .
    <dependency>
      <groupId>org.onap.ccsdk.features.sdnr.northbound</groupId>
      <artifactId>sdnr-northbound-features-installer</artifactId>
      <version>${ccsdk.sli.core.version}</version>
      <classifier>repo</classifier>
      <type>zip</type>
    </dependency>
    <dependency>
      <groupId>org.onap.ccsdk.features.sdnr.northbound</groupId>
      <artifactId>helloworld-installer</artifactId>
      <version>${ccsdk.sli.core.version}</version>
      <classifier>repo</classifier>
      <type>zip</type>
    </dependency>
    <dependency>
      <groupId>org.onap.ccsdk.features.sdnr.northbound</groupId>
      <artifactId>goodbyeworld-installer</artifactId>
      <version>${ccsdk.sli.core.version}</version>
      <classifier>repo</classifier>
      <type>zip</type>
    </dependency>
  </dependencies>
. . .
</project>
```

Add dependencies for the zip files for the two features and for the new component meta-features

ccsdk/distribution/odlsli/src/main/docker/Dockerfile

```
# Base ubuntu with added packages needed for open ecomp
# FROM onap/ccsdk-odl-oxygen-image:${project.version}
FROM nexus3.onap.org:10001/onap/ccsdk-odl-oxygen-image:latest
MAINTAINER CCSDK Team (onap-ccsdk@lists.onap.org)
ENV JAVA_HOME /usr/lib/jvm/java-8-openjdk-amd64
ENV ODL_HOME /opt/opendaylight
ENV SDNC_CONFIG_DIR /opt/onap/ccsdk/data/properties
ENV CCSDK_SLI_CORE_REPO mvn:org.onap.ccsdk.sli.core/ccsdk-sli-core-all/${ccsdk.sli.core.version}/xml/features
ENV CCSDK_SLI_ADAPTORS_REPO mvn:org.onap.ccsdk.sli.adaptors/ccsdk-sli-adaptors-all/${ccsdk.sli.adaptors.version}/xml/features
ENV CCSDK_SLI_NORTHBOUND_REPO mvn:org.onap.ccsdk.sli.northbound/ccsdk-sli-northbound-all/${ccsdk.sli.northbound.version}/xml/features
ENV CCSDK_SLI_PLUGINS_REPO mvn:org.onap.ccsdk.sli.plugins/ccsdk-sli-plugins-all/${ccsdk.sli.plugins.version}/xml/features
ENV SDNR_NORTHBOUND_REPO mvn:org.onap.ccsdk.features.sdnr.northbound/sdnr-northbound-all/${ccsdk.sli.core.version}/xml/features
ENV ANSIBLE_GPG_KEY ${ansible.gpg.key}

# copy the opendaylight credentials
COPY idmlight.db.mv.db $ODL_HOME/data


# copy CCSDK mvn artifacts to ODL repository
COPY system /tmp/system
RUN rsync -a /tmp/system $ODL_HOME && rm -rf /tmp/system

# Add CCSDK repositories to boot repositories
RUN cp $ODL_HOME/etc/org.apache.karaf.features.cfg $ODL_HOME/etc/org.apache.karaf.features.cfg.orig
RUN cat $ODL_HOME/etc/org.apache.karaf.features.cfg.orig | sed -e "\|featuresRepositories|s|$|, ${CCSDK_SLI_CORE_REPO}, \
  ${CCSDK_SLI_ADAPTORS_REPO}, ${CCSDK_SLI_NORTHBOUND_REPO}, ${CCSDK_SLI_PLUGINS_REPO}, ${SDNR_NORTHBOUND_REPO}|" \
  > $ODL_HOME/etc/org.apache.karaf.features.cfg
RUN echo featuresBoot=config,standard,region,package,kar,ssh,management,odl-restconf-all,odl-mdsal-all,odl-mdsal-apidocs,\
  odl-daexim-all,ccsdk-sli-core-all,ccsdk-sli-adaptors-all,ccsdk-sli-northbound-all,ccsdk-sli-plugins-all
  ,sdnr-northbound-all >> $ODL_HOME/etc/org.apache.karaf.features.cfg

. . .

ENTRYPOINT /opt/onap/ccsdk/bin/startODL.sh
EXPOSE 8181
```

Add an environment variable for SDNR features

Append the variable to the boot repositories

And add the feature name to the boot features

Smoke Test

Now that everything is in place, we can execute the pom.xml file in **ccsdk/distribution/odlsli**.

```
%: mvn --activate-profiles docker --quiet clean package
0.3.0-SNAPSHOT
New Tag for docker:0.3-STAGING-latest
     [echo] ******** Displaying value of property ********
     [echo] project.version: 0.3.0-SNAPSHOT
     [echo] project.docker.latesttag.version: 0.3-STAGING-latest
     [echo] maven.build.timestamp: 20180831T232902Z
0.3.0-SNAPSHOT
New Tag for docker:0.3-STAGING-latest
%: docker run --detach --network="yaml_default" --link ccsdk_db_container:dbhost --link ccsdk_db_container:sdnctldb01 --link ccsdk_db_container:sdnctldb02 --publish 8383:8181 --env MYSQ
L_ROOT_PASSWORD=openECOMP1.0 --env SDNC_CONFIG_DIR=/opt/onap/ccsdk/data/properties --name ccsdk_odlsli_container onap/ccsdk-odlsli-image:latest
a616d2f010dd68ef54401ea8e947ae9804d20ed8e49060bfacd64410542665a0
%: docker exec -it ccsdk_odlsli_container /bin/bash
root@a616d2f010dd:/# $ODL_HOME/bin/client
Logging in as karaf

Hit '<tab>' for a list of available commands
and '[cmd] --help' for help on a specific command.
Hit '<ctrl-d>' or type 'system:shutdown' or 'logout' to shutdown OpenDaylight.

opendaylight-user@root>feature:list -i | grep sdnr
sdnr-goodbyeworld              | 0.3.0.SNAPSHOT   |          | Started | sdnr-goodbyeworld              | ccsdk-features-sdnr-northbound :: goodbyeworld ::
sdnr-northbound-all            | 0.3.0.SNAPSHOT   | x        | Started | sdnr-northbound-all            | ccsdk-features-sdnr-northbound :: features :: sdn
sdnr-helloworld                | 0.3.0.SNAPSHOT   |          | Started | sdnr-helloworld                | ccsdk-features-sdnr-northbound :: helloworld :: s
opendaylight-user@root>
```

Success! And to show that it actually works.

helloworld(2015-01-05)

Show/Hide | List Operations | Expand Operations | Raw

POST /operations/helloworld:greeting

Response Class

Model | Model Schema

(greeting)output-TOP

Response Content Type application/json

Parameters

Parameter	Value	Description	Parameter Type	Data Type
(greeting)input-TOP	{"input":{"salutation":"World"}}		body	(greeting)input-TOP

Parameter content type: application/json

Try it out! Hide Response

Request URL

```
http://localhost:8383/restconf/operations/helloworld:greeting
```

Response Body

```
{
  "output": {
    "response": "Hello World"
  }
}
```

Response Code

```
200
```

Response Headers

```
{
  "Access-Control-Allow-Origin": "http://localhost:8383",
  "Access-Control-Expose-Headers": "location",
  "Access-Control-Allow-Credentials": "true",
  "Transfer-Encoding": "chunked",
  "Content-Type": "application/json"
}
```

goodbyeworld(2015-01-05)

Show/Hide | List Operations | Expand Operations | Raw

POST /operations/goodbyeworld:greeting

Response Class

Model | Model Schema

(greeting)output-TOP

Response Content Type application/json ▾

Parameters

Parameter	Value	Description	Parameter Type	Data Type
(greeting)input-TOP	{"input":{"salutation":"World"}}		body	(greeting)input-TOP

Parameter content type: application/json ▾

Try it out! Hide Response

Request URL

```
http://localhost:8383/restconf/operations/goodbyeworld:greeting
```

Response Body


```
{
  "output": {
    "response": "Goodbye World"
  }
}
```


Response Code

```
200
```

Response Headers


```
{
  "Access-Control-Allow-Origin": "http://localhost:8383",
  "Access-Control-Expose-Headers": "location",
  "Access-Control-Allow-Credentials": "true",
  "Content-Type": "application/json",
  "Transfer-Encoding": "chunked",
  "Expires": "Thu, 01 Jan 1970 00:00:00 GMT"
}
```